

# **ANATOMY & PHYSIOLOGY**

## **THE MUSCULAR SYSTEM**

The Study of muscles is called **Mycology**.

There are three types of muscles:

1. Smooth or Visceral Muscle
2. Cardiac Muscle
3. Skeletal or Striated muscle

### **SMOOTH OR VISCERAL MUSCLES:**

1. These muscles are under involuntary control governed by the autonomic nervous system.
2. The cells of this muscles are Spindle shaped and form into bundles.
3. Each cell contains a nucleus, but there is no distinct membrane, which gives them a smooth flat appearance.
4. Walls of blood and lymph vessels.
5. Walls of the intestines to move the food along the digestive tract (peristalsis).

### **CARDIAC MUSCLE:**

1. This is specialized tissue found in the heart.
2. It forms the wall of the heart and pumps blood around the body.
3. This is involuntary muscle tissue under the control of the autonomic nervous system.
4. The structure resembles voluntary muscle as fibers are striated and each cell has a nucleus.
5. This type of muscle rarely tires.

### **SKELETAL/ STRIATED MUSCLE:**

1. Viewed under a microscope, transverse stripes are visible which is why skeletal muscle is also known as striated.
2. Works with tendons and bones to move the body.
3. It is also referred to as voluntary muscle because it is under conscious control.
4. The brain transmits impulses via motor nerves to initiate contraction of muscle fibres. The muscle contracts producing movement at joints.

### **STRUCTURE OF SKELETAL MUSCLE:**

1. Muscle fibres are arranged in bundles called fascicule.
2. A complete muscle will contain many bundles of fibres.

3. The muscles fibres are long thin multi nucleated cells.
4. They are made up of a smaller protein threads called myofibrils.
5. Myofibrils has actins and myosin protein threads that slide into each other causing the myofibril to shorten resulting in muscle contraction.
6. Mitochondria or power house are also present in the muscles fibres. They store energy in form of glycogen and myoglobin.

### **Muscles Tone:**

1. Muscles is always in a state of partial contraction even when resting.
2. Different groups of fibres contract alternatively to prevent muscles from becoming fatigued.
3. The amount of contraction is only enough to produce tautness in the muscles.
4. This continuous process of contraction and relaxation of fibres is necessary for maintaining posture.

### **Muscle Fatigue:**

1. Glucose is the fuel muscles need, together with oxygen which burns the glucose to make energy.
2. If muscles overwork without sufficient rest periods there is a shortage of glucose and oxygen, thus muscles cannot produce enough energy to contract.
3. Waste products such as lactic acid and carbon dioxide accumulate in muscle causing stiffness and pain.
4. Rest and gentle massage will speed up venous return and increase the circulation to the muscle.

### **GROUP ACTION OF MUSLCES:**

#### **Prime Mover or Agonist:**

1. Movement performed by the muscle.

#### **Antagonist:**

1. Situated on the opposite side of the joint from the prime mover.
2. This muscle relaxes and lengthens so that the movement produced by the prime mover is smooth.

#### **Synergist:**

1. Assist the prime mover to produce an efficient movement.

**Muscle Response to Heat & Cold:**

1. During exercise body temperature increases, superficial capillaries dilate and sweating occurs which helps to cool the body.
2. If body temperature drops below a certain level an involuntary action occurs that cause the muscles to shake as they produce rapid contractions.
3. This reaction helps to raise body temperature.

**Diseases & Disorders:**

1. Fibrosistis: Inflammation of muscle fibres.
2. Sprain: Tearing or over stretching of a ligaments causing swelling and bruising.
3. Strain: Micro tears within some fibres of the muscle or its tendon.
4. Muscular Dystrophy: Collapse of muscle leading to loss of function.
5. Multiple Sclerosis: A disorder in which small patches of the central nervous system and nerves destroyed and the healthy tissue replaced by plaques.